Code :R7321906

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**III B.Tech II Semester(R07) Regular & Supplementary Examinations, April/May 2011**
**DESIGN & ANALYSIS OF ALGORITHMS**
(Electronics & Computer Engineering)

Time: 3 hours

Max Marks: 80

**Answer any FIVE questions**
**All questions carry equal marks**
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1. (a) Discuss in detail about the performance evaluation of an algorithm.

   (b) Explain in detail about the various Asymptotic Notations.

2. (a) Let $S_1 = \{1, 7, 8, 9\}, S_2 = \{2, 5, 10\}, \ and \ S_3 = \{3, 4, 6\}$. Draw the possible tree representations for the above sets.

   (b) What is degenerative tree. Explain it with suitable example.

3. (a) Write a iterative quick sort algorithm to sort a set of elements. Explain it with an example.

   (b) Write the control abstraction for Divide and Conquer.

   (c) Write a short notes on Stressen's matrix multiplication.

4. (a) Write a faster algorithm for job sequencing problem.

   (b) Explain with example, the procedure to find the minimum cost spanning tree by using prim's algorithm.

5. (a) Give brief description about the All pairs shortest paths problem.

   (b) Write a detailed note on the general method of dynamic programming.

6. (a) Write an algorithm to generate the next color for graph coloring problem.

   (b) Draw a state space tree for 4-node graph for 3 colors.

   (c) Write a recursive backtracking algorithm.

7. Consider the travelling salesperson instance defined by the cost matrix.

| $\alpha$ | 20 | 30 | 10 | 11 |
|---|---|---|---|---|
| 15 | $\alpha$ | 16 | 04 | 02 |
| 03 | 05 | $\alpha$ | 02 | 04 |
| 19 | 06 | 18 | $\alpha$ | 03 |
| 16 | 04 | 07 | 16 | $\alpha$ |

   (a) Find the reduced cost matrix.

   (b) Draw the state space tree.

   (c) Find the minimum cost path.

8. (a) Explain the non deterministic sorting and searching algorithms.

   (b) Discuss in detail the different classes in NP-Hard and NP-complete.

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1. (a) Define an algorithm. What are the criteria that should be followed to satisfy an algorithm. Identify the areas where to study the algorithm.

   (b) Give brief description about the Pseudocode conventions.

2. (a) Explain the different operations that can be performed on sets. Present an algorithm for union with weighting rule.

   (b) Explain the different storage representation techniques of sets with suitable example.

3. (a) Explain with example, the merge sort technique to sort a set of elements.

   (b) Prove that the average case time complexity of quick sort is $O(n \log n)$.

4. (a) Explain with example, the procedure to find the minimum cost spanning tree by using kruskal's algorithm.

   (b) Discuss in detail about the general method of a greedy technique.

5. Generate the Optimal Binary Search Tree from the following data: n=4, $(a_1,a_2,a_3,a_4)$=(do, int, if, while). Let P(1:4)=(3,3,1,1) and q(0:4)=2,3,1,1,1 ) and initially w(i, i)=q(i), c(i, i ) =0 and $r(i,i) = 0, 0 \le i \le 4$.

6. (a) Let w=(5,7,10,12,15,18,20 ) and m=35. Find all possible subsets of w that sum to m.

   (b) Write a short notes on graph coloring.

7. (a) Draw the state space tree for travelling sales person problem with n=4 and $i_0$=$i_4$=1.

   (b) Solve the following knapsack problem by using LCBB with n=4, $(p_1,p_2,p_3,p_4)$=(10,10,12,18), $(w_1,w_2,w_3,w_4)$=(2,4,6,9 ) and m=15.

8. Explain the following:

   (a) Decision problem.

   (b) Clique

   (c) Non deterministic machine

   (d) Satisfiability.

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Max Marks: 80

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1.  (a) Write an algorithm for finding the Fibonacci sequence of given number by using iterative method and also write the step table for the same.

    (b) Write a short notes on the following:
        i. Big-Oh Notation
        ii. Omega Notation
        iii. Theta Notation

2.  (a) Union (1,2), union (2,3), union (3,4), union (4,5), ..... union (n-1,n) and find (1), find(2),......find (n). Draw the degenerative tree for the above sequence of operations.

    (b) Write simple algorithms for union and find.

    (c) Write an algorithm for find operation using collapsing rule.

3.  (a) Explain the general method of Divide and Conquer and present a control abstraction for the same.

    (b) Write a short notes on stressen's matrix multiplication.

4.  (a) Write an algorithm to generate the minimum cost spanning tree by using kruskal's technique. Explain it with suitable example.

    (b) Give brief description about the single source shortest paths.

5.  (a) Write an algorithm to find the minimum cost binary search tree.

    (b) Explain merging and purging rules with suitable examples.

6.  (a) Write a recursive backtracking algorithm for sum of subsets problem.

    (b) Draw the state space tree for mcoloring when n=3 and m=3.

    (c) Write an algorithm to estimate the efficiency of backtracking technique.

7.  (a) Write the control abstraction for LC-search.

    (b) Explain in detail about FIFO branch and bound and LC Branch and Bound.

8.  Give brief description about the cooks theorem.

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Time: 3 hours

Max Marks: 80

Answer any FIVE questions
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1. (a) Write an algorithm to find the magic square of a given number.

   (b) Give brief description about randomized algorithms.

2. (a) Give brief description about the bi connect components.

   (b) Define spanning tree. Explain the different set operations with suitable examples.

3. (a) Write an algorithm to sort a set of elements by using quick sort technique.

   (b) Sort the following array of elements by using merge sort technique
       (179,285,310,351,652,254,423,861,450,520 )

4. (a) Write a greedy algorithm to generate shortest paths.

   (b) Presents an algorithm to generate the minimum cost spanning tree by using prim's technique. Explain it with suitable example.

5. (a) Find the optimal solution to the following knapsack problem by using dynamic programming. Let n=3, $(w_1,w_2,w_3)$= (2,3,4), $(p_1,p_2,p_3)$=(1,2,5).

   (b) Write an informal knapsack algorithm by using Dynamic programming.

6. (a) Draw the solution space organization for the sum of subsets for n=4, $(w_1,w_2,w_3,w_4)$=(11,13,24,7) and m=31.

   (b) Explain in detail the sum of subsets problem by using dynamic programming.

7. (a) Explain the least cost search technique with example.

   (b) Discuss in detail about the bounding in Brand and Bound.

8. Write the non deterministic algorithms of the following:

   (a) Knapsack problem.

   (b) Clique

   (c) Satisfiability.

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